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(54) Open Roof construction for a vehicle

(57) An open roof construction for a vehicle having an opening (2) in its fixed roof (1) comprises a stationary part (3) to be fixed to the roof, a closure element (9) supported by the stationary part. The stationary part is slidably guided along guideways (6) in the stationary part (3, 6) at its side edges by means of sliding shoes (15, 16), which sliding shoes form part of a sliding shoe unit (11). The guideway (6) comprises a flange (10) having opposed sides, on which the sliding shoes engage. The sliding shoes (15, 16) of the sliding shoe units (11) respectively engage one of the sides of the flange (10), and in that the sliding shoes (15, 16) engaging the opposed sides of the flange are so designed that they clamp the flange between them under spring pressure.

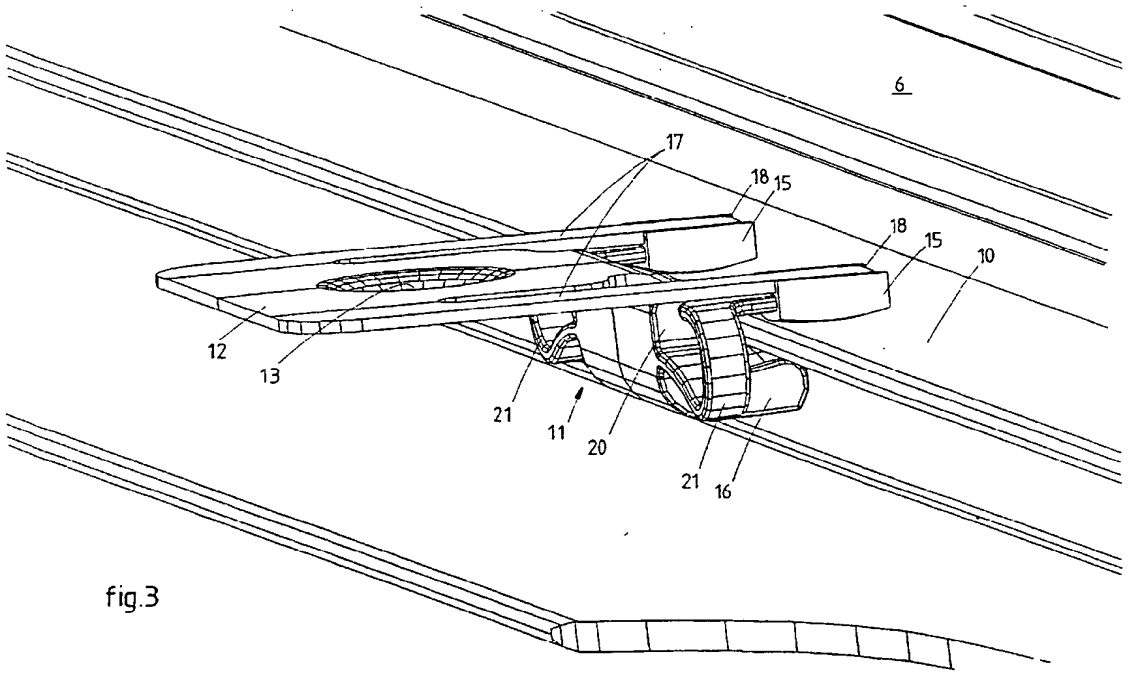

fig.3

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Description

[0001] The present invention relates to an open roof construction according to the preamble of claim 1.

[0002] Such an open roof construction is known, for example from JP-A-10166866. Said open roof construction employs sliding shoe units, which comprise spring-loaded sliding shoes, which each engage round the flange of the guide rail. To this end, the sliding shoes are shaped as a horizontal U.

[0003] The object of the invention is to provide a further improved open roof construction for a vehicle.

[0004] In order to accomplish that objective, the open roof construction according to the invention exhibits the features defined in the characterizing portion of claim 1.

[0005] As a result of the fact that separate sliding shoes engage the opposed sides of the flange of the guide rail, in combination with the spring load (in vertical direction), no play will occur between the sliding shoes and the flange. Furthermore it will be easy to compensate for tolerances, so that the sliding shoe unit is less critical as regards production tolerances. It is possible thereby for a sliding shoe on one side of the flange to provide the vertical reference, whilst the sliding shoe on the other side will mainly provide the spring action.

[0006] Advantageously, the sliding shoe unit comprises three sliding shoes, two of which engage one side of the flange whilst one engages the other side of the flange.

[0007] In this way each sliding shoe unit can slide along the flange without exhibiting a tendency to tilt, in particular if the first sliding shoes engaging one side of the flange are positioned outwards of the second sliding shoe engaging the other side thereof.

[0008] In an embodiment which is advantageous as regards the production tolerances, each sliding shoe unit comprises a metal mounting element, and at least said second sliding shoe has been formed around a supporting portion of the mounting element by means of an injection moulding process. Any tolerances in the supporting portion of the mounting element will be compensated by injection-moulding the sliding shoe in the correct position thereon.

[0009] The invention will now be explained in more detail with reference to the drawings, which schematically show an exemplary embodiment of the invention.

[0010] Fig. 1 is a very schematic top plan view of a vehicle roof fitted with the embodiment of the open roof construction according to the invention.

[0011] Fig. 2 is a larger-scale sectional view along line II-II in Fig. 1, wherein only the sun screen and the guide rail are shown for the sake of clarity.

[0012] Fig. 3 is a larger-scale perspective view of a sliding shoe unit and the guide rail.

[0013] Fig. 4 is a perspective view of the sliding shoe unit of Fig. 3, seen from the other side.

[0014] Fig. 1 shows the fixed roof of a motor vehicle, in this case a passenger car. Said fixed roof 1 is provided with an at least substantially rectangular roof opening 2 for the purpose of mounting an open roof construction therein. The open roof construction comprises a stationary part, in this case a frame 3, which is fixed to the underside of the fixed roof 1 of the vehicle.

[0015] In the illustrated embodiment the open roof construction is a so-called sliding roof or tilt-sliding roof, which comprises a panel 4 which is preferably transparent and which is more or less rigid in this embodiment, which panel is capable of selectively closing the roof opening 2 or releasing it to a greater or lesser extent. Panel 4 is to this end laterally supported by operating mechanisms 5, which are slidably accommodated in guide rails 6 which are mounted on frame 3 or which form part thereof, and which extend in longitudinal direction, parallel to each other, on either side of roof opening 2 and rearwards thereof. Said operating mechanisms 5 can be moved synchronously in guide rails 6 and thus move the panel not only in longitudinal direction but also in vertical direction. To this end the operating mechanisms 5 are actuated from a driving device 7, such as an electric motor, for example via pull-push cables 8.

[0016] Besides panel 4, the open roof construction also comprises a lower closure element, in this case in the form of a sun screen 9, which is slidably guided with its side edges with respect to guideways 10 of guide rails 6. Sun screen 9 can be moved forward and rearward manually or automatically, for example, or be moved together with panel 4. According to the invention, the guideways 10 for the sun screen are flat flanges extending parallel to sun screen 9, that is, at least substantially horizontally.

[0017] Sun screen 9 is fitted with a number of sliding shoe units 11, two sliding shoe units 11 on each side edge of the sun screen in this embodiment, in order to enable sliding movement of sun screen 9 along flanges 10.

[0018] Figs. 2 - 4 show one of the sliding shoe units 11 in more detail. Each sliding shoe unit 11 comprises a mounting element 12 cut out of metal, which is provided with a mounting hole 13 in a horizontal portion thereof, by means of which the sliding shoe unit 11 can be fixed to the sun screen 9 by means of a screw 14 or other fastener. The mounting element 12 of the sliding shoe unit 11 furthermore functions to support sliding shoes, two first sliding shoes 15 and one second sliding shoe 16 in this embodiment.

[0019] First sliding shoes 15 are intended for engaging the upper side of flange 10, and they are supported by an associated arm 17. Arms 17 are integral with the mounting element 12 and extend outwards in transverse direction, at least substantially parallel to flange 10 and sun screen 9, at least substantially horizontally in most cases. Arms 17, which are flat in horizontal direction and which extend in a straight line, are arranged for springing movement in a direction at least substantially perpendicularly to the respective sliding surface of flange

10, the upper side in this case. The desired spring force of the arms can be varied by a suitable selection of the length, the width and the thickness thereof and also of the material that is used. The first sliding shoes 15 are fixed to the underside of the associated arms 17, for example by being injection-moulded thereon or by clamping the arms 17 in a gutter or groove 18 formed on the upper side of the first sliding shoe 15. The side of the first sliding shoe 15 that faces towards flange 10 is rounded in two directions, so that the sliding shoes 15 are only in engagement with a central portion of flange 10.

[0020] The second sliding shoe 16 of each sliding shoe unit 11 is positioned centrally between the two spaced-apart sliding shoes 15, seen in longitudinal direction, whilst the upper side of the second sliding shoe 16 is spaced from the under side of first sliding shoes 15 in vertical direction by such a distance that the sliding shoes 15 and 16 engage the two sides of the flange 10 with some bias. A suitable selection of said bias and of the material for the sliding shoes 15 and 16 makes it possible to exert the desired friction on the sun screen 9, and thus effect the desired braking action, when the sun screen is being moved, as a result of which an even movement of the sun screen 9 can be realised.

[0021] The second sliding shoe 16 has been formed around a downwardly curved supporting portion 19 of the mounting element by means of an injection-moulding process. The second sliding shoe 16 furthermore includes an upright portion 20, which is capable of abutment against the edge of the flange 10 that faces towards the sun screen 9, so that the sun screen 9 can be guided in transverse direction as well. The spring force of the supporting portion 19 of sliding shoe unit 11 enables the second sliding shoe 16 to exert some spring force in transverse direction as well. The first sliding shoes 15 and the second sliding shoe 16 are preferably formed in one piece in one injection-moulding process, to which end the first sliding shoes 15 are connected to the second sliding shoe 16 via a connecting part. The injection-moulding process can thereby take place in the form in which the sliding shoe unit will finally be used, but it is also possible to mould the connecting part 21 as a more or less straight part and subsequently move the first sliding shoes 15 to their final position under the arms 17 by bending the easily yielding connecting part 21.

[0022] Due to its construction and its method of manufacture, the sliding shoe unit 11 as shown is less critical with regard to production tolerances, in particular with regard to the metal mounting element 12, on which the sliding shoes 15 and 16 are formed by means of an injection-moulding process. The single flange 10 of the guide rails 6 thereby makes it easier for the sliding shoes to engage and to effect the required friction and braking action between the guide rails 6 and the sliding shoe unit 11.

Claims

1. An open roof construction for a vehicle having an opening (2) in its fixed roof (1), comprising a stationary part (3) to be fixed to the roof, a closure element (9) supported by said stationary part, which is slidably guided along guideways (6) in the stationary part (3, 6) at its side edges by means of sliding shoes (15, 16), which sliding shoes form part of a sliding shoe unit (11), wherein each guideway (6) comprises a flange (10) having opposed sides, on which the sliding shoes engage, **characterized in that** the sliding shoes (15, 16) of the sliding shoe units (11) respectively engage one of the sides of the flange (10), and **in that** the sliding shoes (15, 16) engaging the opposed sides of the flange are so designed that they clamp the flange between them under spring pressure.

2. An open roof construction according to claim 1, wherein each sliding shoe unit comprises three sliding shoes, two of which (15) engage one side of the flange (10), whilst one (16) engages the other side of the flange.

3. An open roof construction according to claim 2, wherein first sliding shoes (15) engaging one side of the flange are positioned outwards of a second sliding shoe (16) engaging the other side thereof.

4. An open roof construction according to claim 2 or 3, wherein the first sliding shoes (15) are provided on resilient metal arms (17), preferably extending transversally and substantially horizontally in outward direction and are designed to spring in a direction substantially perpendicular to the respective sliding face of the flange (10), to which end the armes (17) are constructed as arms which are flat in horizontal direction.

5. An open roof construction according to claim 1, wherein each sliding shoe unit (11) comprises a metal mounting element (12), and wherein at least said second sliding shoe (16) has been formed around a supporting portion (19) of the mounting element by means of an injection moulding process.

6. An open roof construction according to any one of the preceding claims, wherein the sliding shoes (15, 16) of a sliding shoe unit (11) have been formed in one piece by means of an injection-moulding process, and are preferably interconnected by yielding connecting parts (21).

7. An open roof construction according to claims 4 and 5, wherein said first sliding shoes (15) are each provided with a groove or gutter (18), in which the associated metal arm (17) is clamped.

8. An open roof construction according to claim 6 or 7, wherein said sliding shoes (15, 16) are rounded on the side that faces towards the flange (10), whilst the flange is preferably flat and preferably extends at least substantially parallel to the closure element (9).

9. An open roof construction according to any one of the preceding claims, wherein at least one (16) of said sliding shoes (15, 16) includes an upright portion (20), which is capable of abutment against said guide rail (6), in particular against an edge of the flange (10) that faces towards the closure element (9).

10. An open roof construction according to any one of the preceding claims, wherein each sliding shoe unit (11) is fixed to the closure element (9) by means of a screw (14) or such fastener.

11. An open roof construction according to any one of the preceding claims, wherein said closure element (9) is formed by a sun screen, which is capable of movement under an upper closure element (14), such as a transparent panel, which may or may not be movable.

12. An open roof construction for a vehicle having an opening (2) in its fixed roof (1), comprising a stationary part (3) to be fixed to the roof, a closure element (9) supported by said stationary part. which is slidably guided along guideways (6) in the stationary part (3, 6) at its side edges by means of sliding shoes (15, 16), which sliding shoes form part of a sliding shoe unit (11), wherein each guideway (6) comprises a flange (10) having opposed sides, on which the sliding shoes engage, **characterized in that** at least one sliding shoe unit (11) comprises three sliding shoes (15, 16), at least two of which (15) engage one side of the flange (10), whilst at least one other sliding shoe (16) engages the other side of the flange, wherein said sliding shoes (15, 16) preferably engage said flange under spring pressure.

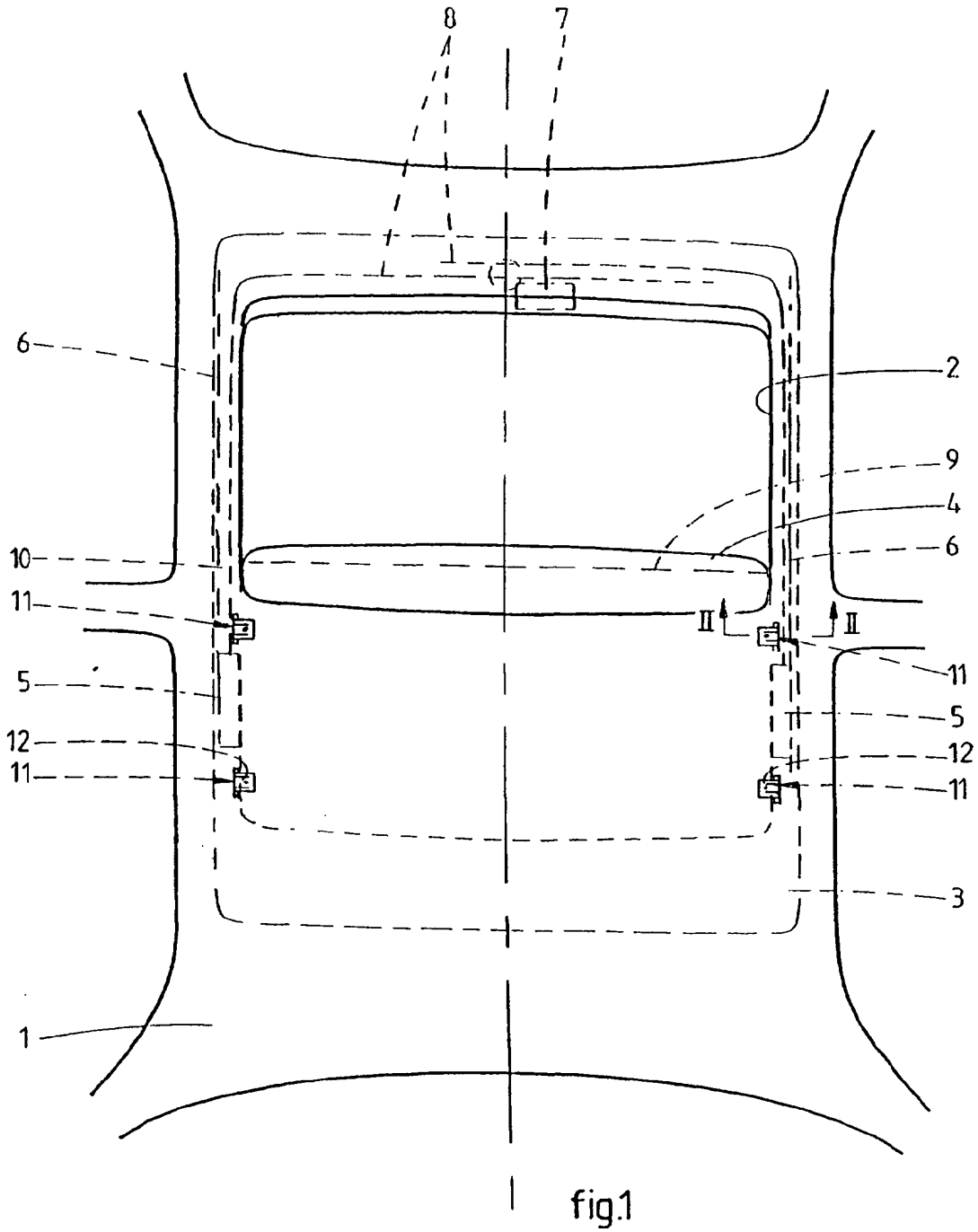

fig.1

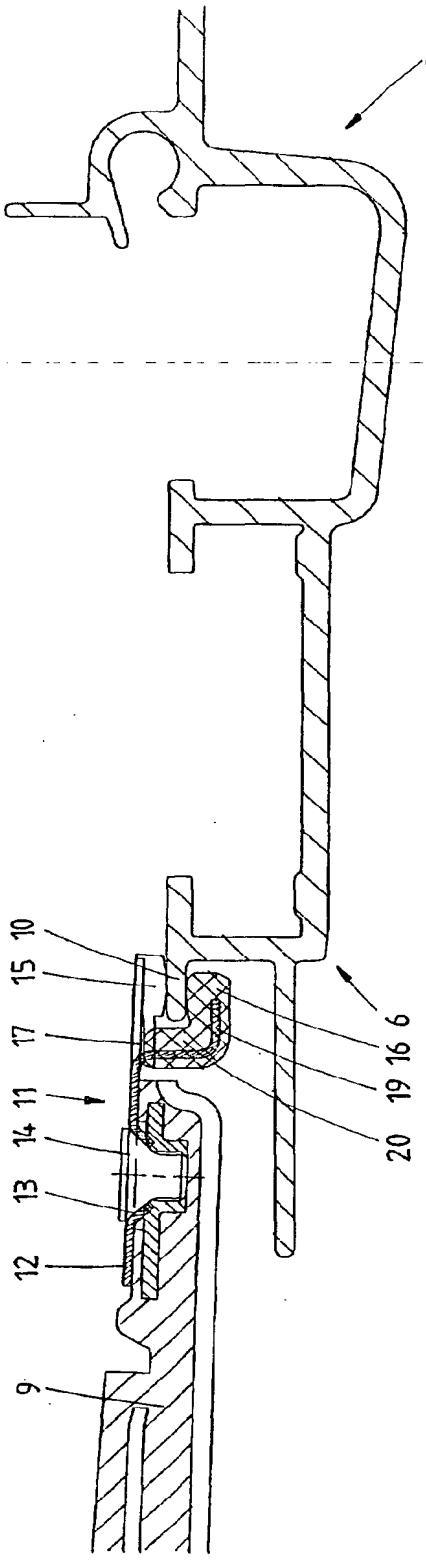

fig. 2

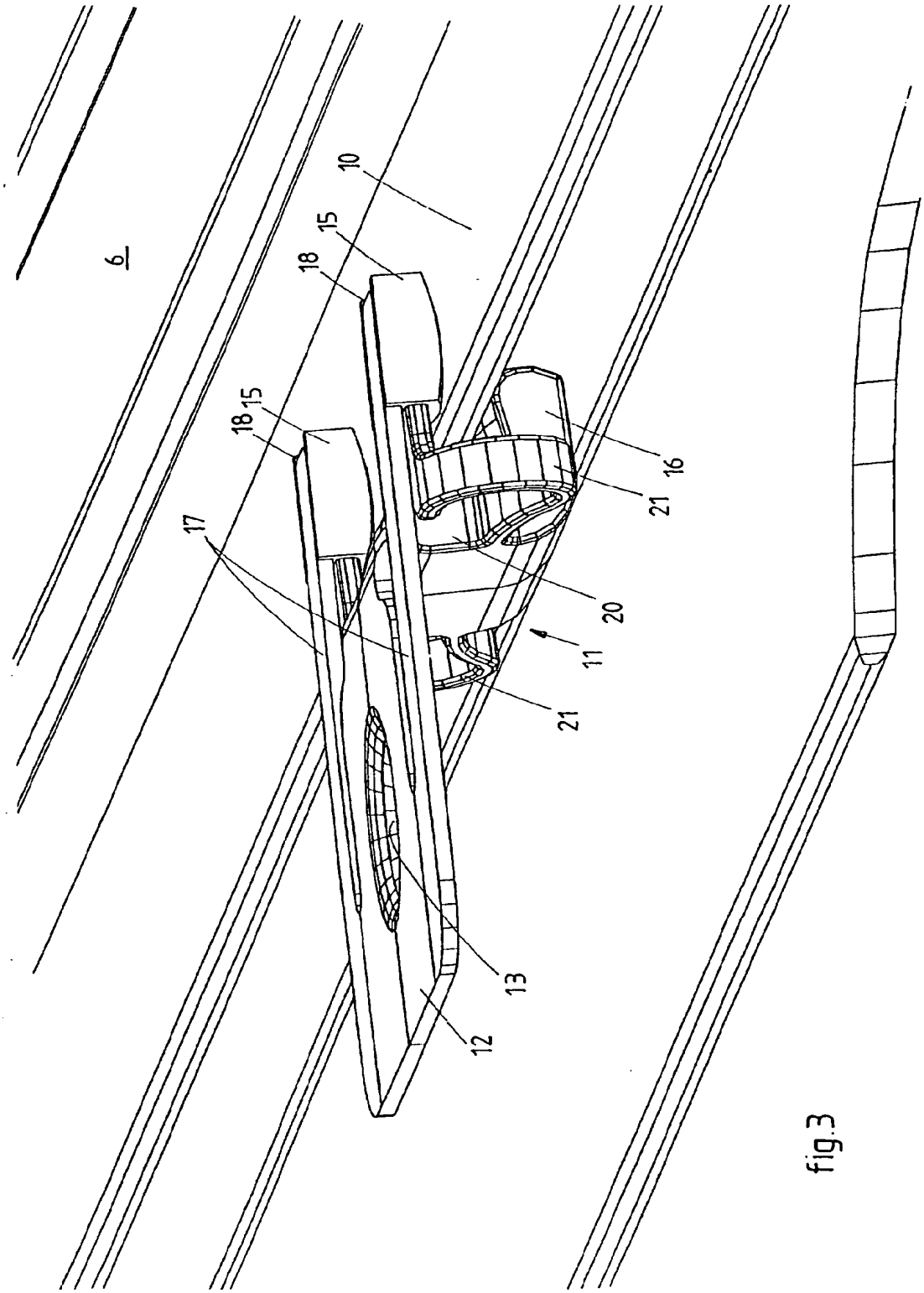

fig.3

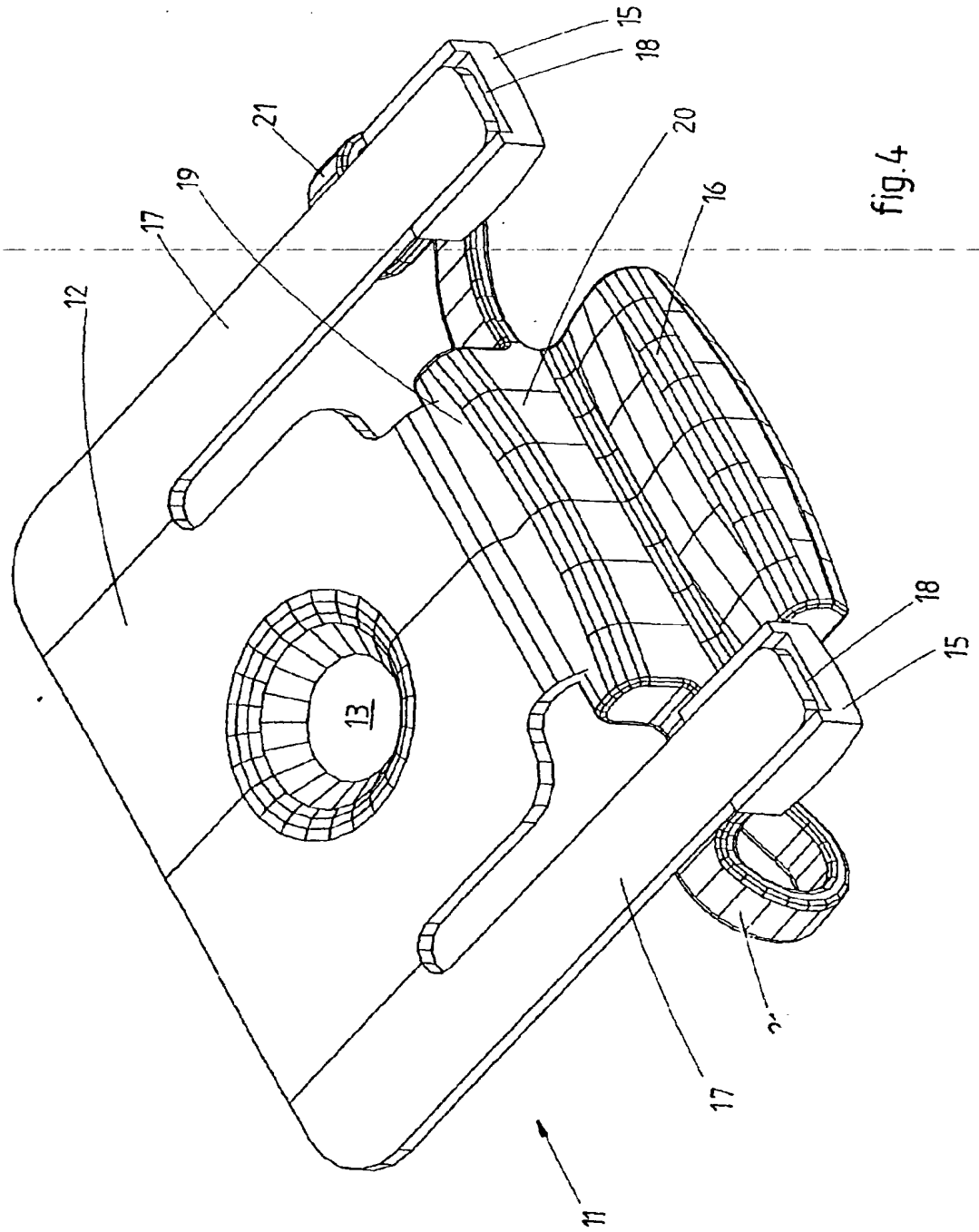

fig.4

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EUROPEAN SEARCH REPORT

Application Number
EP 01 20 3372

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 3 005 226 A (OFFENBACH) 24 October 1961 (1961-10-24) * column 1, line 65 - column 2, line 60; figures 1-3 * -----	1,12	B60J7/02

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B60J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 January 2002	Foglia, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 20 3372

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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15-01-2002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3005226 A	24-10-1961	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82